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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/083,533	02/27/2002	Hiroshi Hashimoto	020244	6400

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EXAMINER	
LE, THAO X	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 12/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/083,533	HASHIMOTO ET AL.	
	Examin r	Art Unit	
	Thao X Le	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 October 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7,8 and 16-40* is/are pending in the application.

4a) Of the above claim(s) *16-39* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7,8 and 40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. The amendment filed on 10/17/03, in the Remarks section page 16 first paragraph, the Applicant indicated that claims 6 and 9 have been canceled. Claims 10-15 depend on claim 9; thus claims 9-15 and 6 are being withdrawn from the consideration.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior Art (APA) in view of US 6544845 to Yoo et al.

Regarding to claims 1, APA discloses a semiconductor integrated circuit (IC) device fig. 1Q, comprising: a substrate 11, a nonvolatile memory device 16F formed in a memory cell

region (flash memory cell A), of substrate 11 and having a multilayer gate electrode structure comprising a tunnel insulating film 12A covering substrate 11 and floating gate electrode 13A formed on the tunnel insulating film 12A and having a side wall surfaces covered with a protection insulating film formed of an oxide 16S; and a semiconductor device (transistor) formed in a device region of substrate 11, the semiconductor device comprising a gate insulating film 12B covering substrate 11 and gate electrode 16B formed on the gate insulating film 12B, the gate insulating film 12B is interposed between substrate 11 and the gate electrode 2B have a substantially uniform thickness, fig. 1Q, an impurity concentration of a source region of said nonvolatile memory device is increased (area 11b), specification page 6 lines 10-20, so as to reduce concentration of an electric field on an edge of the floating gate electrode, the concentration of the electric field being caused by a high voltage applied to the source region at a time of erasing an electric charge from said nonvolatile memory device.

But, APA does not discloses the device wherein a bird's beak structure is formed of oxide film at an interface of the tunnel insulating film and the floating gate electrode, the bird's beak structure penetrating into the floating gate electrode along the interface from the sidewall faces of the floating gate electrode and the bird's beak structure increases a thickness of the tunnel insulating film at the edge of the floating gate electrode so as to prevent the tunnel insulation film from being degraded by the concentration of the electric field on the edge of the floating gate electrode.

However, Yoo reference discloses a device wherein a bird's beak structure 518, fig. 11, column 4 line 25-34 and column 9 line 10, is formed of oxide film at an interface of the tunnel insulating film 502A and the floating gate electrode 504A, the bird's beak

structure penetrating into the floating gate electrode 504A along the interface from the sidewall faces of the floating gate electrode 504A, and the bird's beak structure increases a thickness of the tunnel insulating film at the edge of the floating gate electrode, fig. 11, so as to prevent the tunnel insulation film from being degraded by the concentration of the electric field on the edge of the floating gate electrode. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the bird's beak structure teaching of Yoo with APA's device, because the bird's peak would have improved the performance of IC nonvolatile memory as taught by Yoo, column 4 lines 8-19.

The process limitations "the thermal" in claim 1, does not carry weight in a claim drawn to structure. In re Thorpe, 277 USPQ 964 (Fed. Cir. 1985).

With respect to 'so as to reduce concentration of an electric field on an edge of the floating gate electrode, the concentration of the electric field being caused by a high voltage applied to the source region at a time of erasing an electric charge from said nonvolatile memory device and so as to prevent the tunnel insulation film from being degraded by the concentration of the electric field on the edge of the floating gate electrode', such limitations is obvious because the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be obvious. *In re Best*, 195 USPQ 430, 433 (CCPA 1977).

Regarding to claims 2-5, APA discloses the IC device wherein the multiplayer gate electrode structure further comprises an insulating film 14A, fig. 1H, formed on the floating gate electrode 13A and a control gate electrode 16A formed on the insulated film 13A, wherein each

of the gate electrode and control gate electrode comprises doped polysilicon, specification page 4 lines 20-35, wherein the oxide film forming the protection insulating film connects to the bird's beak structure, wherein the protection insulating film 18 continuously covers sidewall faces and a top surface of the multilayer gate electrode structure, fig. 1K.

Regarding to claims 7-8, APA discloses the IC device having the tunnel oxide 12, spec. page 2 or nitride, page 4.

Regarding claim 40, as discussed in the above claim 1-5,7-8, the APA and Yoo disclose all the limitations of claim 40.

Response to Arguments

5. Applicant's arguments with respect to claims 1-5, and 7-9 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X Le whose telephone number is 703-306-0208. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Thao X. Le
December 9, 2003